



Welcome!

# Best Management Practices for Equine Operations

# Project Team Introductions



Durham, Orange, Wake, Granville,  
and Person Counties



# Module 1

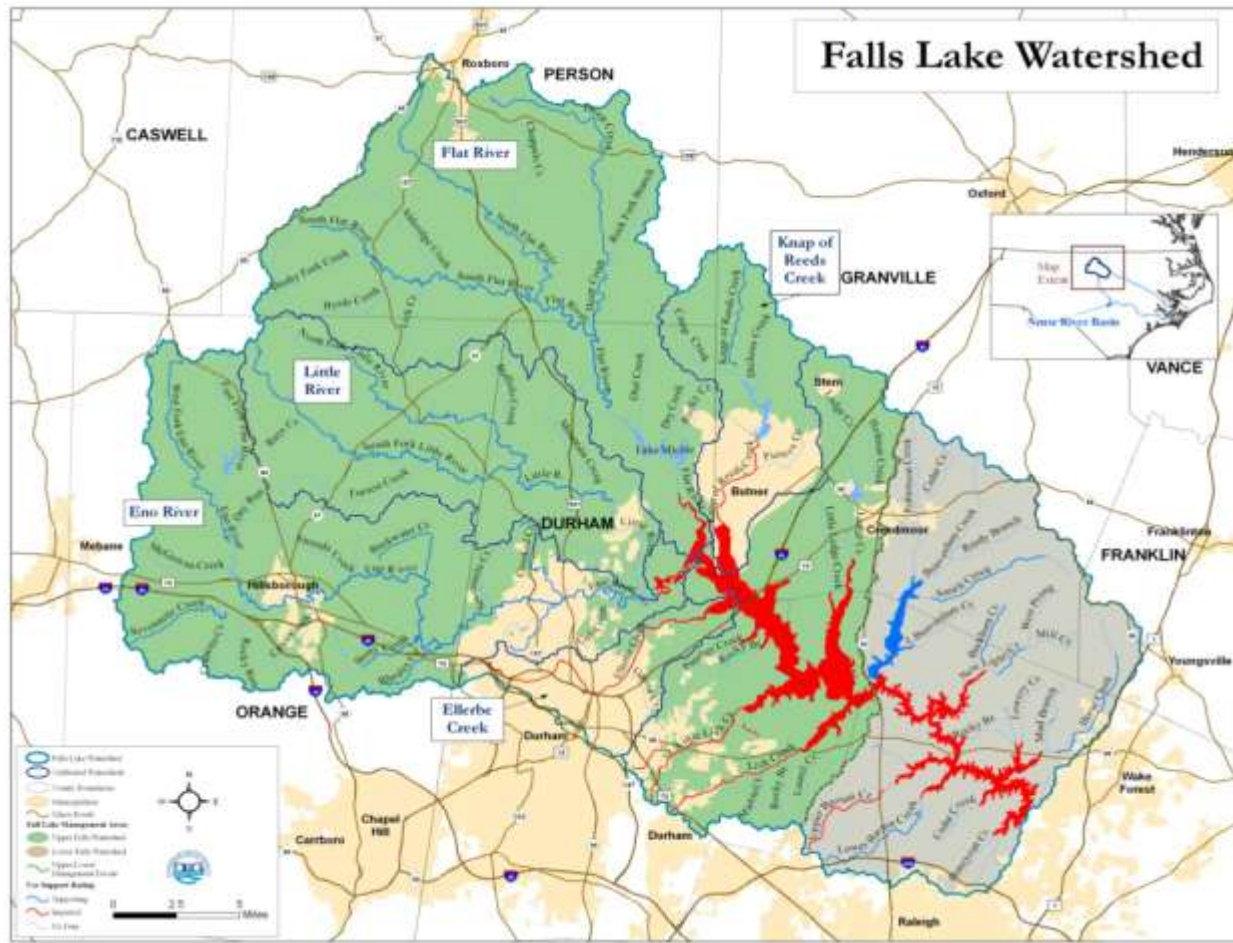
## Overview of Falls Lake Regulations Affecting Ag

# Where is the Falls Lake Watershed?

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- All of the land area draining to Falls Lake
- Upper portion of the Neuse River Basin
- Orange, Person, Granville, Wake, Durham and a small part of Franklin Counties

# Falls Lake Watershed



# What is the problem with Falls Lake?

- An algae (Chlorophyll-a) often exceeds the State of North Carolina's standard of 40 ug/L in samples taken from the Lake and waters draining to it
- Excess nutrients help to feed the algae

# Nutrients: Nitrogen – Phosphorous – Potassium

- What isn't used by plants can be transported in runoff or groundwater
- All three are present in manure and fertilizer

TABLE 1. Annual Raw Manure Production per 1,000 lb Animal Weight.

Animal Type	Manure Tons/yr	Prod Gal/yr	Percent Solids	Nutrient Content					
				N	P2O5	K2O	N	P2O5	K2O
				(lb/ton)			(lb/1,000 gal)		
Dairy	15.0	3614	12.7	10.0	4.1	7.9	41.5	17.0	32.8
Beef	11.0	2738	11.6	11.3	8.4	9.5	45.4	33.7	38.2
Veal	11.5	2738	8.4	8.7	2.1	9.0	36.5	8.8	37.8
Swine									
Growing pig	11.9	3008	9.2	13.8	10.8	10.8	54.6	42.7	42.7
Mature hog	5.9	1425	9.2	13.9	10.8	10.8	57.5	44.7	44.7
Sow & litter	15.9	3894	9.2	14.2	10.7	11.1	58.0	43.7	45.3
Sheep	7.3	1679	25.0	22.5	7.6	19.5	97.8	33.0	83.5
Goat	7.0	1789	31.7	22.0	5.4	15.1	86.1	21.1	59.1
Poultry									
Layers	9.7	2464	25.0	27.3	23.5	13.2	107.5	92.5	52.0
Broilers	13.1	3285	25.0	33.4	16.7	12.5	133.2	66.6	49.8
Turkey	8.4	2044	25.0	23.7	20.8	16.9	97.4	85.5	69.5
Horse	8.2	2048	21.0	12.1	4.6	9.0	48.4	18.4	36.0

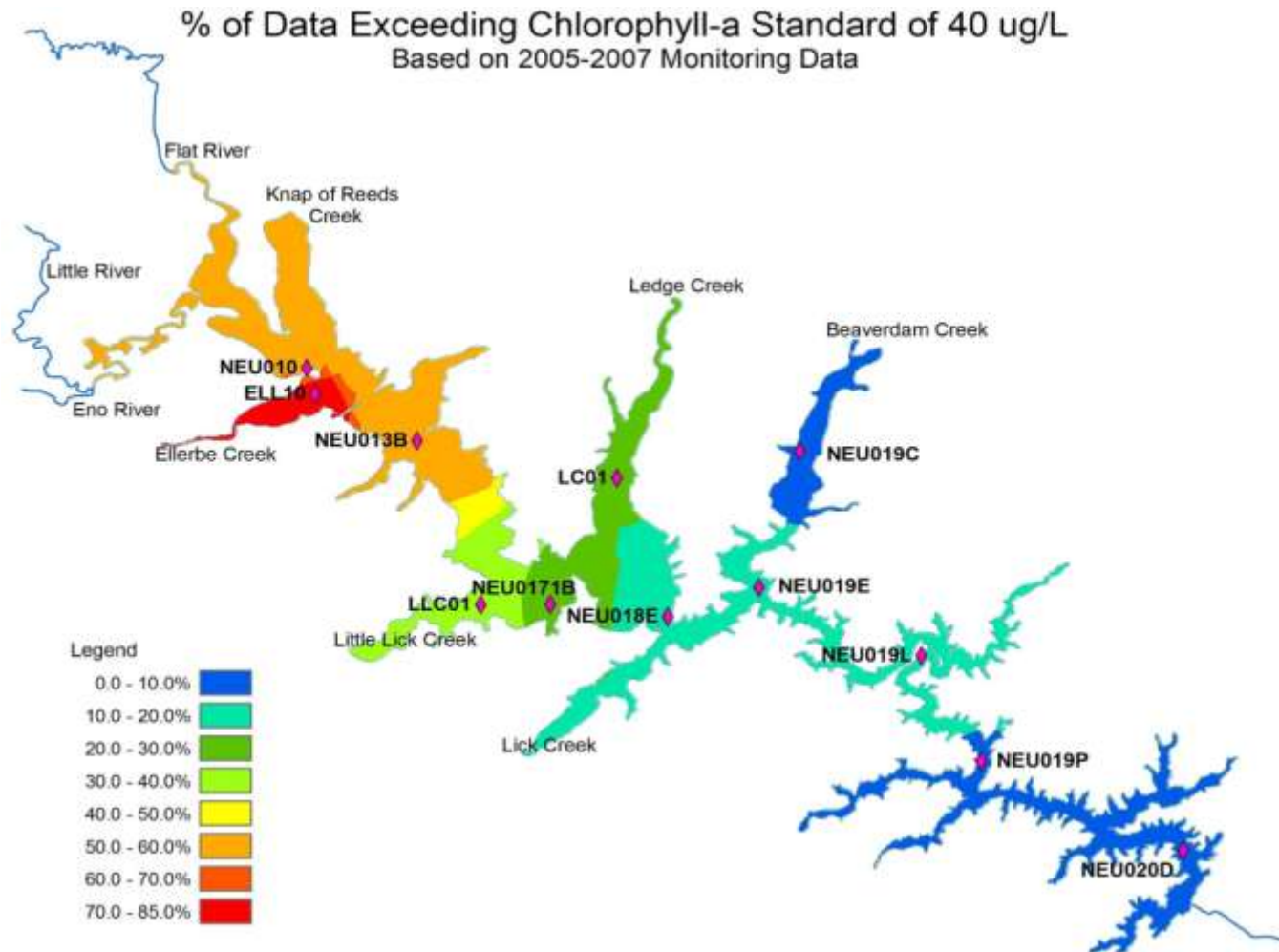


# Nutrient Sources



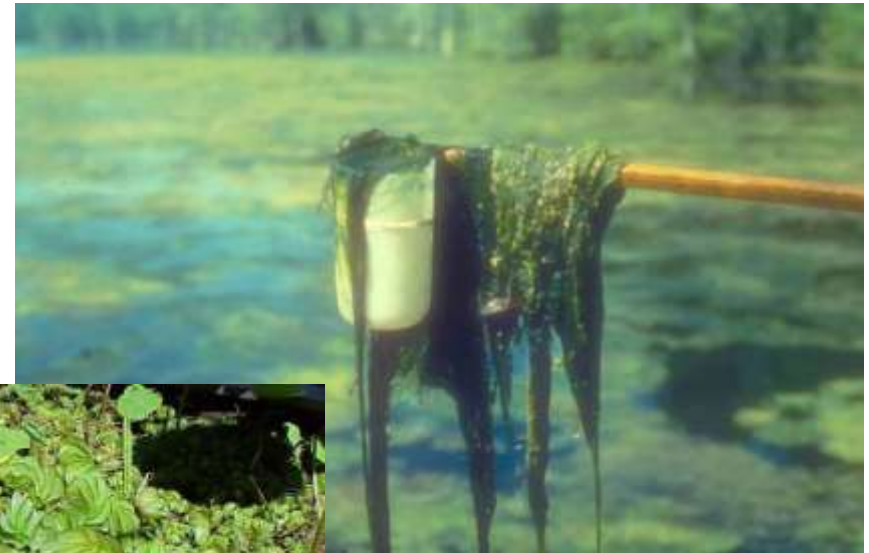


# Chlorophyll-a Problem Areas



# Water Quality Impacts of Nutrients

- Algae blooms and aquatic weeds from excessive nutrients
- Oxygen depletion cycle



# Is anything else a problem?

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- There is also a turbidity problem in the Lake west of 1-85, caused by both sediment (erosion) and algae.
- The NC Sedimentation and Pollution Control Commission was charged with adopting rules to address the turbidity problem.

# What is Soil Erosion ?

- The wearing away of the land surface by physical forces such as rainfall, flowing water, wind, ice, temperature change, gravity or other natural or human agents that abrade, detach and remove soil from one point to be deposited elsewhere
- Accelerated by
  - Land clearing
  - Overgrazing



# Soil Erosion

- **Consequences:**
  - Removal/redistribution of soil
  - Loss of plant productivity
  - Deposition in water (sedimentation)
  - Brings pollutants along





# Soil Erosion Impacts



© The Charlotte Observer-Layne Bailey



# Why do these problems prompt regulation?

- Exceeding water quality standards initiates a federal regulatory process known as Total Maximum Daily Load (TMDL), that sets amounts of pollutants that are allowed in the Lake.
- Also, state law requires nutrient management strategies (rules) be developed for all water supply lakes in the State.



# What was the rulemaking process?

- The Division of Water Quality convened a large group of Falls Lake stakeholders that met for many months.
- Then DWQ developed a set of rules as part of an overall nutrient management strategy for Falls Lake to address the requirements of the state legislation.

# Who adopted this rule?

- The NC Environmental Management Commission
  - After numerous public hearings and hundreds of comments, the Commission's hearing officers revised the proposed rules and the EMC adopted them in November 2010.

# Has agriculture been singled out?

- The rules affect all land uses in the watershed, including farming.
- In addition to agriculture, there are rules that affect stormwater from new and existing development, wastewater discharges, stormwater from state and federal entities, and persons applying fertilizers.

# Draft Falls Lake Rules – Sections

15A NCAC 2B .0275 - .0283

- .0275 Purpose and Scope (Goals)
- .0276 Definitions
- .0277 Stormwater – New Development
- .0278 Stormwater – Existing Development
- .0279 Wastewater Discharges
- **.0280 Agriculture**
- .0281 Stormwater State & Federal Entities
- .0282 Options for Offsetting Nutrient Loads (Trading)

# What is the deadline to reach the goal?

- For agriculture, Stage 1 – by 2020

Collective 20% TN reduction

Collective 40% TP reduction

- Stage 2 – by 2036

Collective 40% TN and 77% TP

AND

Mandatory 20' Buffers Must Be Installed and All  
Livestock Must be Fenced from Waters (if the Stage  
1 Goal Is Not Met By 2020).

# What will farmers need to do?

- Collectively, farmers (including many equine operations) will need to work together to meet the Stage 1 N and P reduction goals.
- Farmers can work to keep the mandatory buffers and livestock exclusion rules in Stage 2 from going into effect by meeting the Stage 1 goals by 2020.

# What does collective mean?

- Farmers in each county or subwatershed collectively reach the nitrogen and phosphorous reduction goals.
- Some farmers have already done what they can. Others can, and will, be asked to do more.



# What else do I need to do?

- All farmers that the rule applies to had to register by January 2012. Registration goes to NC Soil and Water Division. [www.ncagr.gov/sw/falls-nsw-registration.html](http://www.ncagr.gov/sw/falls-nsw-registration.html)
  - Name
  - Address
  - Phone number
  - Email (if have email)
  - County or Counties in which you tend or own land
  - Number of acres
  - Number of livestock and poultry
- Compliance has been limited

## Module 2

### What is the Equine Operation BMP Project

# Equines & Ag: Does the rule apply to me?

Applies to:

- Commercial production of crops or horticultural products other than trees.
- Research activities in support of same.
- Production or management of any of the following livestock or poultry:
  - **5 or more horses**
  - 20 or more cattle
  - 20 or more swine (not feedlot)
  - 150 or more swine (feedlot)

# Equines & Ag: Does the rule apply to me?

- 120 or more sheep
- 130 or more goats
- 650 or more turkeys
- 3,500 or more chickens
- Any single species of any other livestock or poultry, or any combination of species, that exceeds 20,000 lbs. live weight at any time.

# Equines & Ag: Does the rule apply to me?

- Horse farms are one of few forms of agriculture that is increasing in land area in NC
- They are little understood from a nutrient-loading perspective
- Horse farms are a major agricultural land use in the Falls Lake watershed
- They are regulated under the Falls Lake Nutrient Management Strategy

# Equines & Agriculture: Definition, NC

## General Statutes

### 1. § 106-581.1. Agriculture defined.

For purposes of this Article, the terms "agriculture", "agricultural", and "farming" refer to all of the following:

1. The cultivation of soil for production and harvesting of crops, including but not limited to fruits, vegetables, sod, flowers and ornamental plants.
2. The planting and production of trees and timber.
3. Dairying and **the raising, management, care, and training of livestock, including horses**, bees, poultry, and other animals for individual and public use, consumption, and marketing.
4. Aquaculture as defined in G.S. 106-758.
5. The operation, management, conservation, improvement, and maintenance of a farm and the structures and buildings on the farm, including building and structure repair, replacement, expansion, and construction incident to the farming operation.
6. When performed on the farm, "agriculture", "agricultural", and "farming" also include the marketing and selling of agricultural products, agritourism, the storage and use of materials for agricultural purposes, packing, treating, processing, sorting, storage, **and other activities performed to add value to crops, livestock, and agricultural items produced on the farm**, and similar activities incident to the operation of a farm. (1991, c. 81, s. 1; 2005-390, s. 18; 2006-255, s. 6.)

# Equines & Agriculture:

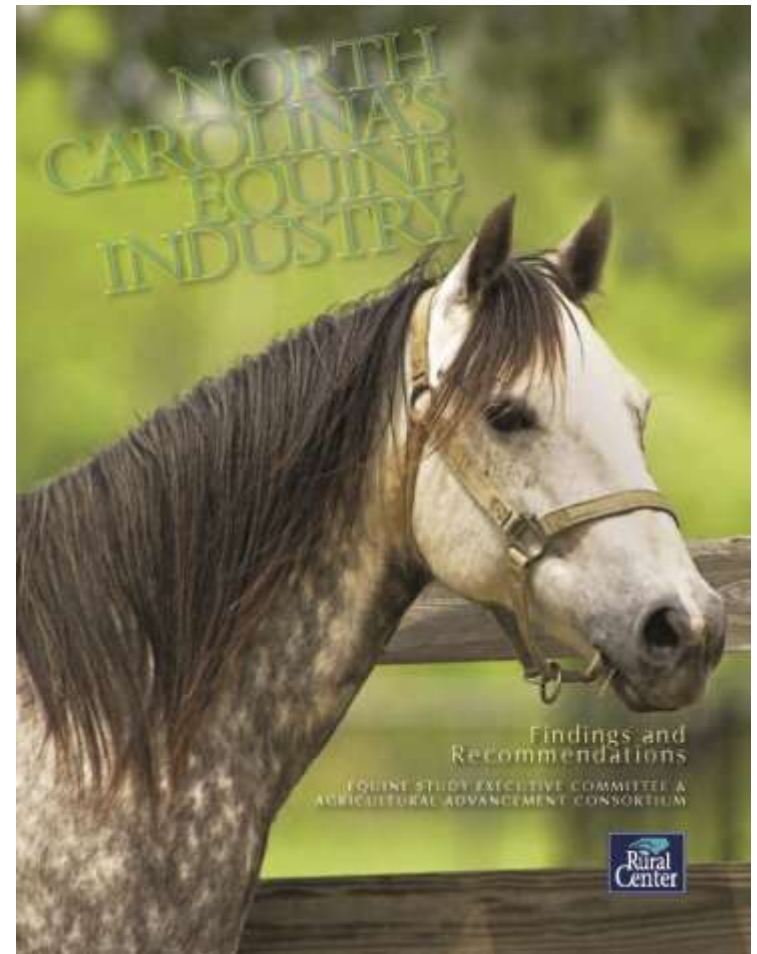
## Present Use Definition, NC General Statutes

- **Present Use Taxation for Agricultural Land (usually less than “fair market value”) § 105-277.3. Agricultural (land) Classified.**
  - ...the tract must meet the income requirement for agricultural land and must consist of at least 10 acres that are in **actual production**. To meet the income requirement, the agricultural land must for the three years preceding January 1 of the year for which the benefit is claimed, have produced an average gross income of at least \$1,000.
- **Production is food or fiber; not boarding, training, lessons, or just keeping your own horses.**



# What is the NC Equine industry?

- Total annual economic impact: \$1.9 billion
- Federal, state and local taxes paid: \$196 million
- Equine-owning households or operations: 53,095
- Acreage in equine operations: 2.1 million
- **Average number equine per operation: 5.8**
- Total number of equine: 306,210
- Total number of jobs: 19,183
- Expenditures on goods and services: \$1.4 billion
- Expenditures within home county: 72%
- Expenditures within state: 90%



# Where is the NC Equine Industry?

## North Carolina's Equine Industry

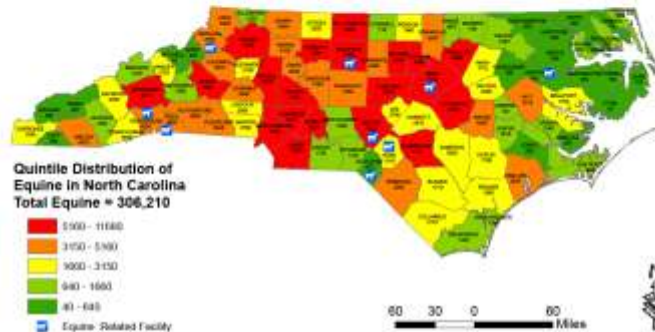
Findings and Recommendations

May 2009

*Equine Study Executive Committee & Agricultural Advancement Consortium*

Population of Equine by County in North Carolina

DRAFT



2008 Human Population By County in North Carolina

DRAFT



# Equines and Agriculture

- A common misconception is that horse operators are better able to afford BMPs than traditional livestock operators.
  - 43% of horse operators in NC had total average household incomes below \$85,000 and 21% had incomes below \$55,000 (North Carolina Rural Economic Development Center, 2009).
  - In comparison, the total average household income for a poultry operator in North Carolina was \$107,000; for a hog operator was \$106,000; and for a cattle operator was \$52,000 (US Department of Agriculture, Economic Research Service).
  - In 2007, the average gross receipts for on-farm horse operations were \$23,903; average gross expenses were \$25,896

# Availability of Assistance

- NC Agricultural Cost Share Program
  - Administered by NCDA&CS – Division of Soil and Water Conservation
  - A voluntary program to protect water quality with BMPs
  - Includes financial incentives, technical and educational assistance, research, and regulatory programs
  - Landowners/renters of an agricultural operation for 3+ years are eligible

# Availability of Assistance

- NC Agricultural Cost Share Program
  - Horse farms eligible for STATE cost share assistance through ACSP, using the State definition of agriculture (includes horse operations).
  - Applications ranked based on a local priorities e.g., most water quality benefit
  - Small “non-commercial” horse farms often don’t rank and compete well
- Horse farms are NOT eligible for FEDERAL USDA cost share assistance due to the food or fiber requirements



# Availability of Assistance

- New rules mean there will be increased demand for limited cost share and technical assistance to meet agricultural nutrient reduction goals.
- The Equine Operations BMP grant provides some assistance to scale and implement BMPs for equine operations (slightly under \$102,000)
- Funding source is EPA 319 Grant Funds administered by the NCDENR Division of Water Quality

# Project Team and Roles

- Division of Soil and Water Conservation/Districts
  - Project Administration
  - Conservation Planning, BMP Design, Layout, Education
- NC Horse Council
  - Engineering/Technical Assistance for BMPs
  - Equine Industry Knowledge, Education, Outreach
- Sustainable Stables
  - Technical Assistance for BMPs
  - Equine-specific BMP Education & Outreach

# Equine Operations BMP Goals

- Reduce nutrient loading from equine livestock operations through:
  - Installation of 28 nutrient-reduction BMPs
    - Exclusion fencing; buffer restoration; pasture renovation; alternate water supply; dry lot; aerated static compost system
  - Education and outreach on BMPs to horse farms throughout Falls watershed and beyond
- Refine BMP design for cost-effective application to equine operations
- Help restore/improve impaired waters/303d listed streams



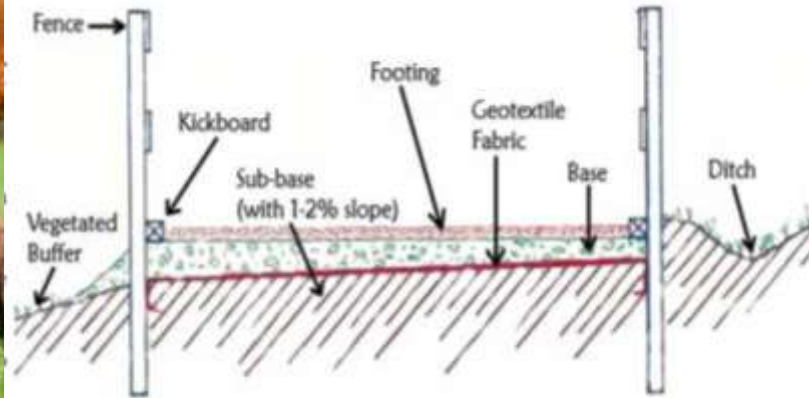


# Module 3

## What Are BMPs & How Do They Work

# Best Management Practices: Defined

- Practices that reduce the movement of nutrients, sediment and other pollutants from land to water



# Pasture Management : Why is is important





# Pasture Management : Why is is important



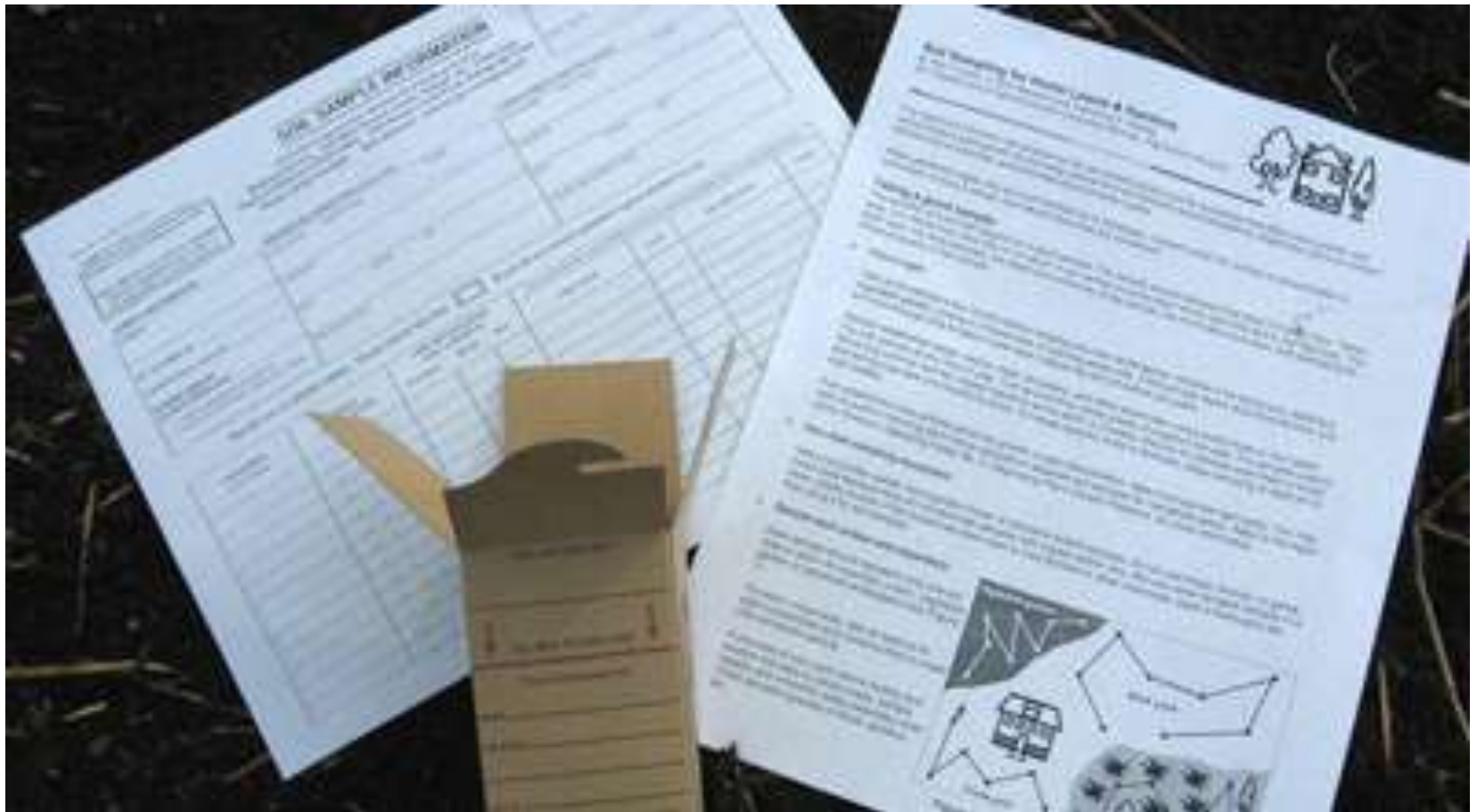
# Pasture Management: How to achieve it

- Soils Testing & Fertilization
- Rotational Grazing
- Sacrifice and Heavy Use Areas
- Exclusion Fencing



*Photo credit: University of Maryland*

# Soils testing and fertilization



*Photo credit: NC State University*



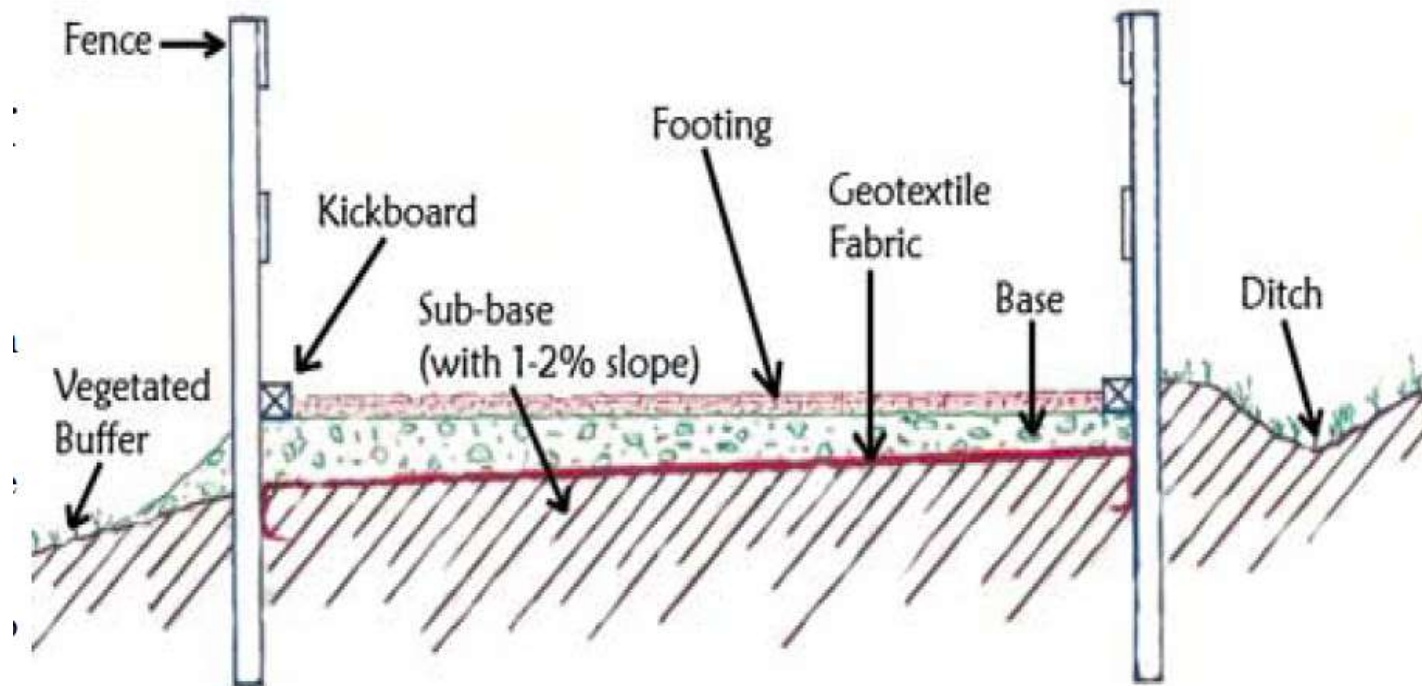


Image credit: [www.ansc.umd.edu](http://www.ansc.umd.edu)



# Sacrifice & Heavy Use Areas

Diagram of a Sacrifice Area : Longitudinal Section



<http://clallam.scc.wa.gov> 3

From "Heavy Use Areas: A guide for Planning & Building Heavy Use Areas for Horses & Livestock" : <http://clallam.scc.wa.gov>



# Sacrifice Areas: Examples



# Sacrifice Areas: Examples





# Heavy Use Areas



# Heavy Use Areas: Examples





# Exclusion Fencing



# Exclusion Fencing

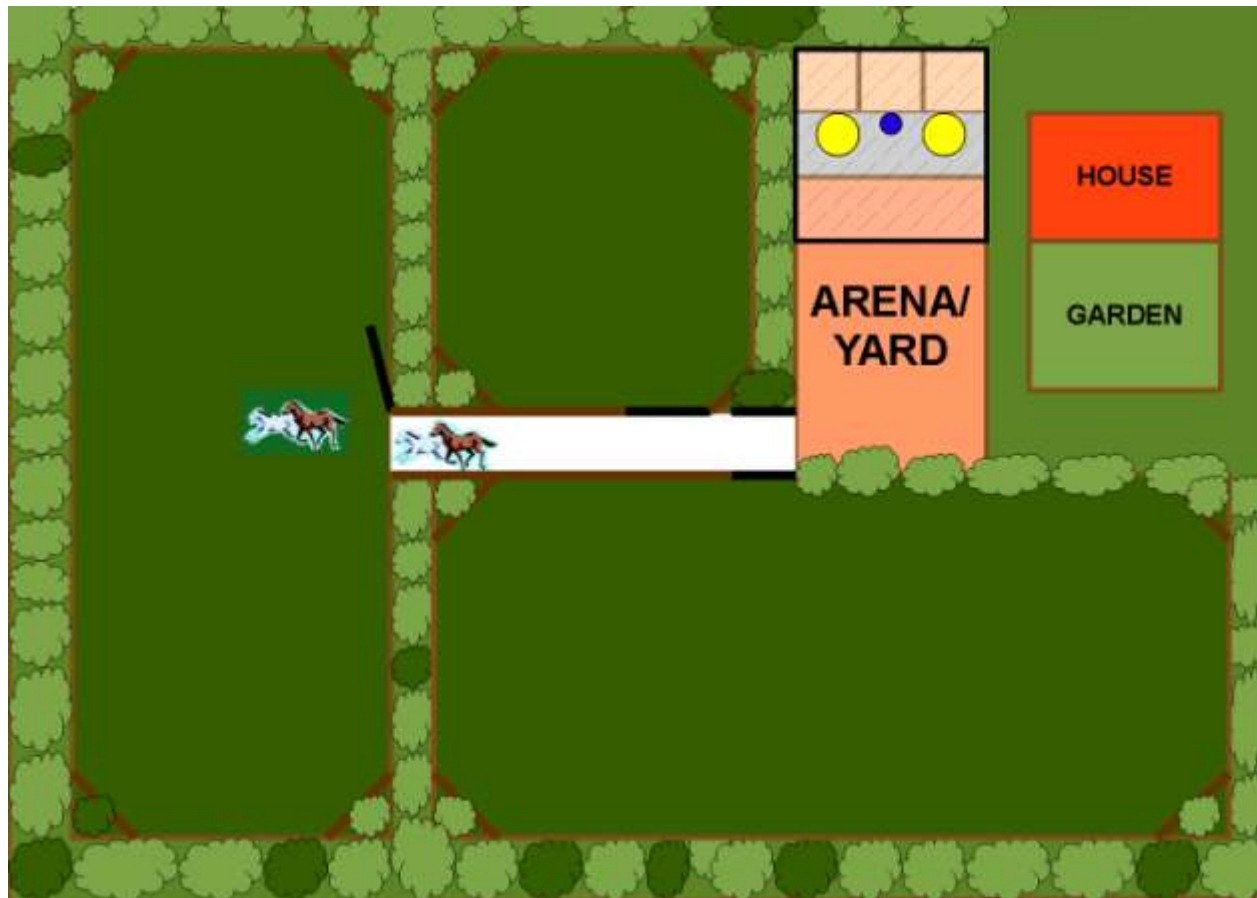




# Putting it all together: Track Style Paddock



# Putting it all together: Equicentral System



*Image courtesy of Equiculture.com.au*



# Manure Management

	Manure Produced <sup>1</sup>	Nitrogen Produced	Phosphorus Produced	Potassium Produced
One 1,000 lb horse	9 tons/yr	99 lbs/yr	18 lbs/yr	72 lbs/yr
All horses in Wake Co. (7,730)	69,570 tons/yr	765,270 lbs/yr	139,140 lbs/yr	556,560 lbs/yr
All horses in NC (306,000)	2,754,000 tons	30,294,000 lbs/yr	5,508,000 lbs/yr	22,032,000 lbs/yr

1. Includes manure and urine; does not include bedding

Sources: Rutgers Equine Science Center (1 ton of manure contains 11 lbs N, 2 lbs P, 8 lbs K); NC Equine Industry Study (May, 2009)

# Composting : Pile Management

- Storage
- Oxygen
- Moisture
- Carbon : Nitrogen Ratio
- Temperature



# Composting : Examples





# Composting : Examples



# Composting : Examples



# Composting : Using Finished Compost



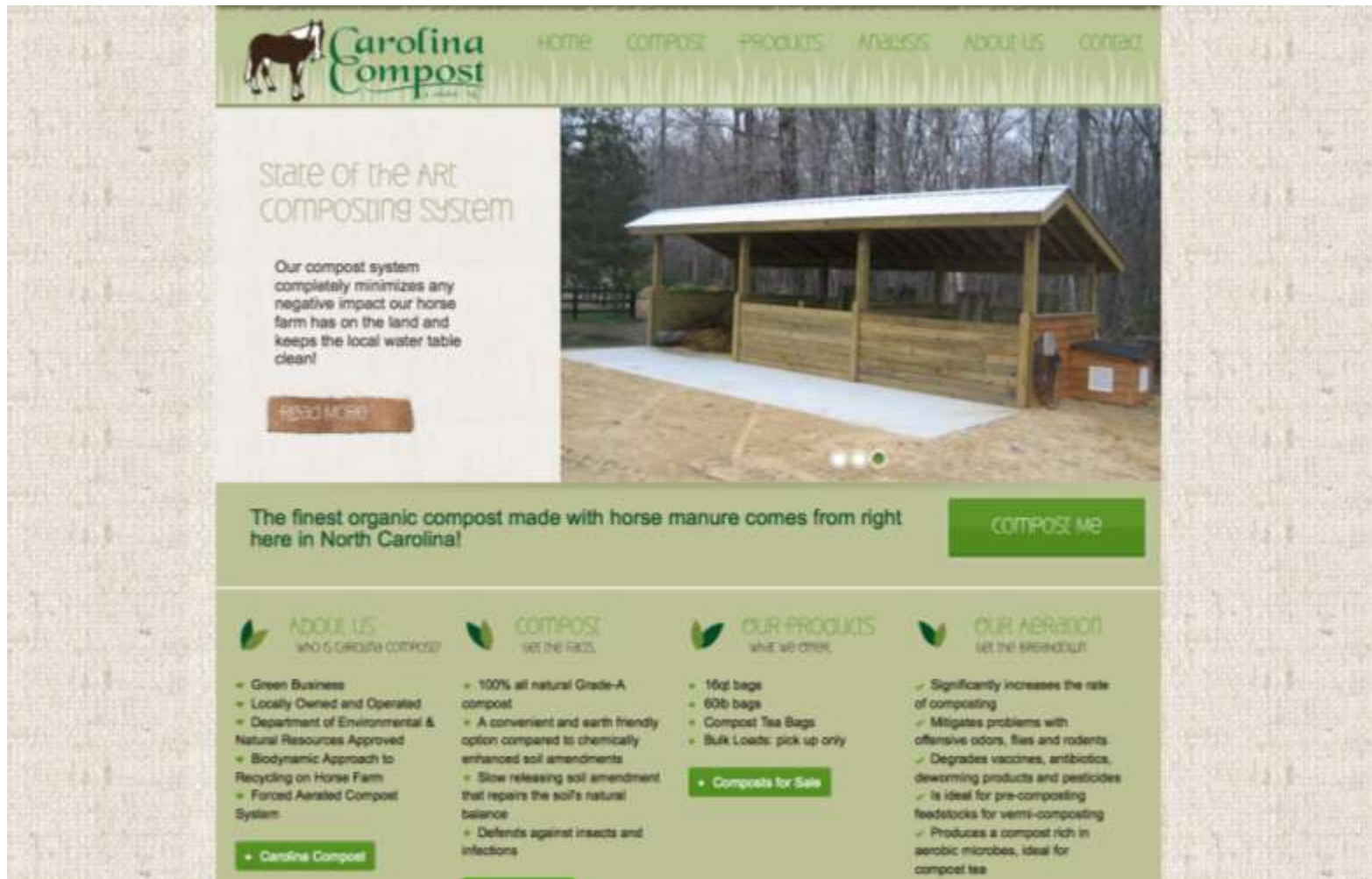
*Photo credit: newerspreader.com*



*Photo credit: millcreekspreaders.com*



# Composting : Using Finished Compost



The screenshot shows the Carolina Compost website. The header features the company logo (a horse and the text 'Carolina Compost') and navigation links: HOME, COMPOST, PRODUCTS, ANALYSIS, ABOUT US, and CONTACT. The main content area is divided into two columns. The left column has the heading 'State of the Art COMPOSTING SYSTEM' and a paragraph: 'Our compost system completely minimizes any negative impact our horse farm has on the land and keeps the local water table clean!'. Below this is a 'Read More' button. The right column features a photograph of a large, open-sided wooden composting structure with a roof, situated in a wooded area. Below the photo is a green button labeled 'COMPOST ME'. The footer is a green banner with four columns of information: 'ABOUT US WHO IS CAROLINA COMPOST?', 'COMPOST GET THE FACTS', 'OUR PRODUCTS WHAT WE OFFER', and 'OUR AERATION GET THE SPREADOUT!'. Each column contains a list of bullet points and a small green button.

**Carolina Compost**  
HOME COMPOST PRODUCTS ANALYSIS ABOUT US CONTACT

**State of the Art COMPOSTING SYSTEM**

Our compost system completely minimizes any negative impact our horse farm has on the land and keeps the local water table clean!

[Read More](#)

**The finest organic compost made with horse manure comes from right here in North Carolina!** [COMPOST ME](#)

**ABOUT US**  
WHO IS CAROLINA COMPOST?

- Green Business
- Locally Owned and Operated
- Department of Environmental & Natural Resources Approved
- Biodynamic Approach to Recycling on Horse Farm
- Forced Aerated Compost System

[Carolina Compost](#)

**COMPOST**  
GET THE FACTS

- 100% all natural Grade-A compost
- A convenient and earth friendly option compared to chemically enhanced soil amendments
- Slow releasing soil amendment that repairs the soil's natural balance
- Defends against insects and infections

**OUR PRODUCTS**  
WHAT WE OFFER

- 16qt bags
- 60lb bags
- Compost Tea Bags
- Bulk Loads: pick up only

[Composts for Sale](#)

**OUR AERATION**  
GET THE SPREADOUT!

- ✓ Significantly increases the rate of composting
- ✓ Mitigates problems with offensive odors, flies and rodents
- ✓ Degrades vaccines, antibiotics, deworming products and pesticides
- ✓ Is ideal for pre-composting feedstocks for vermi-composting
- ✓ Produces a compost rich in aerobic microbes, ideal for compost tea

# Other Soil & Water Best Practices

- Gutters and Downspouts
- Vegetated Swales & Rain Gardens
- Rainwater Harvesting



# Gutters & Downspouts



# Rain gardens & drainage swales





# Rain gardens & drainage swales



# Rainwater Harvesting



# Additional Resources

- [SustainableStables.com](http://SustainableStables.com)
- [FarmandStables.com](http://FarmandStables.com)
- [HorsesForCleanWater.com](http://HorsesForCleanWater.com)
- [Equiculture.com.au](http://Equiculture.com.au)
- University & Extension Websites
  - Penn State, U of Maryland, Rutgers

# Module 4

## Candidate Farm Criteria, Contracting Process & Landowner Obligations

# Candidate Farm Selection Criteria

- Nutrient & Soil Reductions
  - Stream proximity and extent
  - Areas identified as high priority for water quality protection
- # BMP's installed
- Funding
- Time table



# Contracting Process





# Land Owner Obligations



Thank You: Any Questions?

